

1 **SURREBUTTAL TESTIMONY OF**

2 **ED BURGESS**

3 **ON BEHALF OF**

4 **CAROLINAS CLEAN ENERGY BUSINESS ASSOCIATION (CCEBA)**

5 **DOCKET NO. 2021-88-E**

6

7

8 **I. INTRODUCTION**

9 **Q. Please state your name, business address, and occupation.**

10 A. My name is Ed Burgess. My business address is 2150 Allston Way, Suite 400, Berkeley  
11 California 94704. I am Senior Director of Strategen Consulting's Government and Utility  
12 Consulting Practice. My core expertise is in policy and regulation of the electric power sector at  
13 the state level, with a specialized focus on economic analysis, technical regulatory support,  
14 resource planning and procurement, utility rates, and policy and program design.

15 **Q. Are you the same Ed Burgess that offered direct testimony in this docket?**

16 A. Yes.

17 **Q. What is the purpose of your surrebuttal testimony?**

18 A. I submit this testimony to provide responses to the rebuttal testimony of witnesses Bell,  
19 David, Kassis and Hanzlik. Primarily, my testimony addresses the fact that Mr. David and Mr.  
20 Bell confirm much of the basis for my earlier testimony. In fact, they both admit that DESC's  
21 proposed VIC is not actually reflective of DESC's past or present operating practices. Further, it  
22 appears from their testimony that DESC does not consider the Guidehouse analysis to be final or  
23 definitive, meaning that the proposed VIC is based on recommendations that DESC may never  
24 adopt, making it speculative and an insufficient basis on which to charge the solar facilities for  
25 integration costs.

1 I also respond to the DESC witnesses' criticisms of my earlier testimony, particularly  
2 those directed at my statements that the assumptions about DESC's operating reserves which  
3 were included in the Guidehouse analysis, and upon which the proposed VIC appears to be  
4 calculated, are unsubstantiated.

5  
6 **II. GENERAL COMMENTS ON DESC'S REBUTTAL TESTIMONY**

7  
8 **Q. Are there any sections of DESC's rebuttal that stood out to you?**

9 A. Yes. While there are many issues in DESC's rebuttal I will address, I would like to draw  
10 special attention to Mr. David's rebuttal testimony on page 7, which confirms many of the facts I  
11 laid out in my opening testimony. First, he confirms that the operating reserves used in his study  
12 are "not what they have been in the past"<sup>1</sup> and "are greater than what DESC currently  
13 maintains."<sup>2</sup> Thus, DESC admits that the proposed VIC is not actually reflective of DESC's past  
14 or present operating practices which are already reliably accommodating Tranche 1 facilities, the  
15 vast majority of which are already operational. Furthermore, regarding future integration costs,  
16 Mr. David notes that "DESC has informed Guidehouse that it is taking the VIC Study's  
17 recommendations for operating reserve levels under advisement."<sup>3</sup> And Witness Bell confirms  
18 that DESC is still "evaluating the study results."<sup>4</sup> Thus, it appears that any future changes to  
19 DESC's current operating practices to integrate solar are still being evaluated, and there is no  
20 evidence that DESC has already committed to any changes on account of Guidehouse's analysis.

---

<sup>1</sup> David Rebuttal, p 7, line 9-10.

<sup>2</sup> David Rebuttal, p 7, line 13-14.

<sup>3</sup> David Rebuttal, p 7, line 11-12.

<sup>4</sup> Bell Rebuttal P. 3, lines 18 – 19.

1 It is worth noting that DESC had originally portrayed the Guidehouse analysis as  
 2 definitive proof of integration costs that will be incurred. Now, however, it appears that the  
 3 Guidehouse analysis represents merely a set of recommendations that the Company may or may  
 4 not adopt.<sup>5</sup> This makes DESC's proposed VIC charge even more troubling. In essence, DESC is  
 5 proposing to charge solar facilities a fixed fee now for possible integration costs it might incur in  
 6 the future *if* it adopts Guidehouse's recommendations – a set of recommendations the Company  
 7 hasn't fully evaluated and are still "under advisement." Meanwhile, DESC has yet to provide  
 8 critical details on how the operating reserve levels recommended by Guidehouse were  
 9 calculated, so there is no way to determine if they are reasonable.

### 11 **III. RESPONSE TO MR. DAVID'S REBUTTAL**

#### 12 *Suitability of the Guidehouse Model for Analyzing Integration Costs*

13 **Q. Mr. David disagreed with your characterization of the Guidehouse results as a "rough**  
 14 **approximation" and described features of Guidehouse's Reference Case forecast to make**  
 15 **the VIC analysis seem more robust.<sup>6</sup> Do you find this testimony compelling?**

16 A. No. I have no doubt that Guidehouse's Reference Case forecast is robust for certain  
 17 modeling efforts related to bulk power systems. However, that does not necessarily mean that the  
 18 exact modeling approach used by Guidehouse in this case is either a) a good representation of  
 19 DESC's operating practices, or b) well-suited for modeling solar integration costs.

<sup>5</sup> Additional statements that Guidehouse analysis is a recommendation appear in David's rebuttal on page 5, lines 10 and 16.

<sup>6</sup> David Rebuttal, p 2, lines 10 through p 3, line 9

1 **Q. Are there any specific aspects of Guidehouse’s modeling approach that you believe are**  
2 **not well-suited for modeling integration costs?**

3 A. Yes. For example, Guidehouse has admitted that PROMOD is limited in terms of its  
4 ability to vary operating reserves within a time period shorter than one month. This means that  
5 the model essentially assumes DESC’s system operators would set a fixed level of operating  
6 reserves at the start of each month and would never be able to adjust that level afterwards, even  
7 in response to the normal daily fluctuations in solar energy due to nighttime and daytime. While  
8 DESC has attempted to make some post-modeling adjustments to account for this limitation, this  
9 is far from ideal. Clearly Guidehouse’s use of PROMOD is not well-suited for a solar integration  
10 cost study, which ideally would examine solar variability (and corresponding operating reserve  
11 needs) on an hourly, or even subhourly basis, rather than monthly. There are other production  
12 cost models that have this capability and many other integration studies that have taken this  
13 superior approach. Yet, DESC and Guidehouse have chosen not to do so.

14  
15 **Q. Mr. David disputed your notion that the Guidehouse model inputs misrepresent DESC’s**  
16 **actual operating practices, claiming that it “worked closely with DESC to verify the**  
17 **operating parameters...” in its study.<sup>7</sup> How do you respond?**

18 A. Even if Guidehouse worked with DESC to verify *some* modeling parameters, this does  
19 not mean that *all* of the input assumptions are correct or aligned with actual operating practices.  
20 Most importantly, Guidehouse assumed required levels of operating reserves for solar that are far  
21 in excess of what DESC currently designates for solar, and far in excess of what would be  
22 needed to accommodate the recent solar decline events that Mr. Hanzlik detailed. For example,

---

<sup>7</sup> David Rebuttal, p 3, line 17-18.

1 Guidehouse assumes 581 MW of operating reserves are required to integrate solar Tranche 1 in  
2 June.<sup>8</sup> This contrasts significantly with the 161 MW (on average) of reserves that DESC actually  
3 designated for solar in June 2021.<sup>9</sup>

4 Similarly, Mr. Hanzlik, who works in DESC's control room, described an event that  
5 occurred on June 18 that led to an unanticipated ~200 MW drop in solar production over two  
6 hours (or ~25 MW per 15-minute interval). This amounts to much less than half of the  
7 Guidehouse-assumed operating reserve requirements for solar of 581 MW.

8 **Q. How did Guidehouse determine the 581 MW of required operating reserves for solar in**  
9 **June?**

10 A. As I explained in my opening testimony, DESC has not provided enough information for  
11 me to verify how this level was determined. While Mr. David described the methodology in  
12 general terms, he did not provide the mathematical formula showing how the 581 MW June  
13 value and other monthly operating reserve requirements were calculated based on the projected  
14 levels of solar production and/or forecast errors. DESC did provide an initial data set that it  
15 claims was used to derive these values,<sup>10</sup> however, the exact algorithm Guidehouse applied to  
16 this data set in order to determine the subsequent reserve requirements has never been revealed.

17  
18 *Significance of Recent Historical Operations (Last 2 Years)*

19 **Q. Mr. David suggested that the cost of solar integration over the last two years is not**  
20 **relevant versus what might occur over the long term.<sup>11</sup> Do you agree?**

---

<sup>8</sup> Exh. PDB Table 11

<sup>9</sup> Reflects the average of solar-designated reserves during solar-producing hours in June 2021. This is based on data provided in the DESC's Attachment to its Response to CCEBA Interrogatory 1-4.

<sup>10</sup> See Guidehouse Flexibility Reserves Requirement Workbooks included in ORS Supplemental 1-4.

<sup>11</sup> David Rebuttal, p 5.

1 A. No. The last 2 years are very relevant to Guidehouse's Tranche 1 VIC analysis because  
2 the vast majority (~90%) of Tranche 1 facilities have been deployed over this time period. As  
3 such, I would expect to see DESC's actual operating reserves for solar (and integration costs)  
4 approaching what Guidehouse modeled for Tranche 1. However, that does not appear to be the  
5 case, as I explained in my opening testimony. In fact, the total operating reserves DESC held  
6 over this time period did not appreciably increase, meaning that there were virtually no  
7 incremental integration costs as DESC has defined it. Meanwhile, DESC admits that there have  
8 been no events during this time period where its operating reserves were insufficient to account  
9 for solar variability.<sup>12</sup> Mr. David suggests that there might still be a reserve shortfall due to  
10 Tranche 1 solar at some point over the next 10-years, however I am skeptical of this assertion. In  
11 support of this, Mr. David points to the fact that the Guidehouse reserve levels were based on a  
12 90<sup>th</sup> percentile of projected shortfalls, meaning there is a chance of a shortfall in at least 1 year  
13 out of 10. However, if the underlying data of shortfall projections is already skewed (which I  
14 believe is the case), then the fact that a 90<sup>th</sup> percentile was used becomes meaningless.

15  
16 **Q. Mr. David's rebuttal suggests that future integration costs might be greater than what**  
17 **DESC has experienced in the last two years, as more solar resources are added (e.g.,**  
18 **Tranche 2 and above). How do you respond?**

19 A. As I stated in my opening testimony, none of my recommendations preclude DESC from  
20 future applications to recover integration costs it incurs from future tranches of solar on a  
21 prospective basis. However, I believe it is premature at this moment for DESC to be requesting  
22 recovery of these costs from existing facilities or those that will be deployed soon. Mr. David's

---

<sup>12</sup> David Rebuttal, p 5, line 14.

1 rebuttal appears to misinterpret my opening testimony as suggesting that I am attempting to tie  
2 future integration costs to past performance.<sup>13</sup> Instead I am merely pointing out that, at a  
3 minimum, the Tranche 1 integration costs DESC proposes are erroneous because Tranche 1  
4 resources are already largely deployed and there has been no corresponding rise in operating  
5 reserves. As Witness Levitas has testified, it is also important that solar facilities have certainty  
6 about the impact of any VIC on project revenues during the current term of their PPAs. I address  
7 this further in the next section.

8  
9 *Uncertainty Caused by the Interim VIC (with Potential True-Up)*

10 **Q. Do you have any first-hand knowledge of how the uncertainty of the interim VIC creates**  
11 **problems for solar developers?**

12 A. Yes. Since the interim VIC was adopted in 2020, I have consulted on multiple projects in  
13 South Carolina that have encountered difficulties obtaining project financing as a result of the  
14 Commission's decision in that case. The concept of the VIC itself (which is relatively  
15 uncommon for solar projects around the country), and the possibility that it could change in the  
16 future through a true-up adjustment led to confusion among financiers and developers.

17  
18 **Q. Given the ongoing problems with DESC's VIC analysis that you've identified, how can**  
19 **the Commission provide solar developers with greater business certainty?**

20 A. First, the Commission should recognize that, although it may be an easier path forward,  
21 the incorrect approach would be to keep the VIC at its current interim level (with possible true-  
22 up) and defer action until an improved VIC study is completed. Doing so will simply perpetuate

---

<sup>13</sup> David Rebuttal, p 6.

1 the current state of uncertainty and would be commercially unreasonable and discriminatory  
2 against QFs. Solar developers should not be held hostage in this manner simply because DESC  
3 did not complete an adequate study of its own integration costs. Thus, I strongly believe the  
4 Commission should either:

5 a) fix the VIC at a level consistent with the recommendations in my opening testimony  
6 (i.e., at zero or at the alternative calculations), or

7 b) eliminate the VIC until the Commission adopts a new avoided cost rate in the future.  
8 Under this latter approach, any future VIC should only apply prospectively to PPAs executed  
9 after that new rate is approved.

10 **Q. Do you believe these approaches are consistent with the Commission's authority under**  
11 **South Carolina statute?**

12 A. Yes. For example, Section 58-41-20 E(3)(b) states the following (with my emphasis on  
13 "prohibit"):

14 In establishing standard offer and form contract power purchase agreements, the  
15 commission shall consider whether such power purchase agreements should **prohibit** any  
16 of the following:

17 (b) the electrical utility reducing the price paid to the small power producer based on  
18 costs incurred by the electrical utility to respond to the intermittent nature of electrical  
19 generation by the small power producer.

20  
21 Furthermore, I believe keeping the VIC as a floating or variable component of avoided costs may  
22 actually be contrary to the common sense meaning of Section 58-41-20(F)(1), which requires  
23 electric utilities to offer "*fixed price* power purchase agreements."  
24  
25



1 DESC's Operating Reserve Requirements in the VIC Analysis

2 **Q. Mr. David testifies that you do “not know whether the company’s current practice of**  
3 **holding incremental operating reserves equal to 40% of expected solar generation is**  
4 **appropriate.”<sup>14</sup> How do you respond?**

5 A. Mr. David’s rebuttal testimony suggested that I was “guessing” what the correct level of  
6 operating reserves should be. However, this is not the case. My conclusion that the 40% level is  
7 unsubstantiated does not equate to a “guess” as to what the correct level should be. In this  
8 instance, Mr. David’s testimony is simply a tactic to shift the burden of proof away from DESC,  
9 which bears the burden of identifying and justifying the correct level of operating reserves. My  
10 main point here was simply that DESC has provided no evidence to support the 40% threshold it  
11 currently uses, let alone the even higher levels of operating reserves that Guidehouse assumes in  
12 its VIC analysis. Furthermore, in prior testimony before the Commission on DESC’s IRP,  
13 DESC’s witnesses testified that for the analysis it conducted as part of its IRP process it  
14 assumed a 35% threshold.<sup>15</sup>

15  
16 **Q. Mr. David’s rebuttal on pages 9 and 10 refers to your interpretation of specific Excel**  
17 **files that DESC has provided regarding its VIC calculations. Specifically, he states that “in**  
18 **these workpapers, Guidehouse’s analysis shows DESC carrying available operating**  
19 **reserves in significant excess of the baseline 250 MW requirement in most hours.” How do**  
20 **you respond?**

---

<sup>14</sup> David Rebuttal, page 7, line 16-19.

<sup>15</sup> Dominion’s (DESC) IRP – Energy Freedom Act 2019-226-E, Hrg. Tr. (“DESC IRP Hrg. Tr.”) Vol. 2, p. 360; lines 6-13.

1 A. Mr. David's rebuttal makes no sense to me. The specific Excel files he references (i.e.,  
2 the "Guidehouse VIC Calculation Workbook" Excel files) do not contain any information about  
3 the amount of operating reserves (i.e. MW) that were included in Guidehouse's analysis or how  
4 they were derived. It is possible that Mr. David meant to refer to another set of workpapers that  
5 actually include references to operating reserves (e.g. the Guidehouse Flexibility Reserves  
6 Requirement Workbooks). However as I stated earlier, none of the workpapers provided to date  
7 reveal precisely how Guidehouse derived the operating reserve requirements for its VIC analysis.

8 On page 11 of his rebuttal, Mr. David tries to dispute this notion by claiming that the  
9 "Guidehouse Flexibility Reserves Requirement Workbook" Excel files that were provided to  
10 CCEBA include the full set of data that Guidehouse used to calculate the incremental operating  
11 reserve requirements for solar. However, even if the initial data Guidehouse used is present in  
12 these Excel files, the exact algorithm and methodology used to calculate the reserve requirements  
13 has still not been produced. Thus I still cannot verify if Guidehouse's approach is correct.

14  
15 **Q. Mr. David's rebuttal on page 12 states that the data DESC provided in the Guidehouse**  
16 **Flexibility Reserves Requirement Workbook Excel files "demonstrates that the impact of**  
17 **geographic diversity on solar forecast error and corresponding operating reserve**  
18 **requirement needs were considered appropriately." Do you agree?**

19 A. No. Simply referring to input data from multiple sites is not proof that geographic  
20 diversity was appropriately accounted for. The way the data from these multiple sites is  
21 aggregated and evaluated needs to be transparently demonstrated and it has not been.  
22 Specifically, DESC should have provided the algorithm showing how the individual solar sites  
23 are aggregated to a system-wide level of solar production. DESC has still not provided any

1 evidence in this case detailing its exact approach to aggregating multiple solar sites for the VIC  
2 analysis. Moreover, as I mentioned in my opening testimony, the workpapers DESC provided in  
3 response to CCEBA 2-14, which it used for the “illustrative examples” on PBD-2, Table 13 used  
4 an incorrect formula for aggregating solar sites. This leads me to believe that the same incorrect  
5 approach may have also been used in the VIC analysis. This is a vitally important issue, since  
6 DESC’s rebuttal testimony has shifted emphasis away from forecast error and to simple  
7 production variability concerns. Geographic diversity, also known as geographic smoothing, is a  
8 significant factor when predicting systemwide solar variability since adding a greater number of  
9 solar facilities across a region has been shown to decrease or “smooth out” the production  
10 variability seen at any individual site, as one would expect.

11  
12 **Q. To summarize, DESC and Guidehouse have not yet provided the underlying formulas**  
13 **and methods used to determine the solar reserve requirements in its modeling. Correct?**

14 A. Yes.

15  
16 **Q. What does Mr. David’s testimony state regarding this?**

17 A. On page 12, Mr. David states that “no such formula workbooks exist as Guidehouse  
18 employed a VBA-based model to conduct Monte Carlo draws to compare the actual generation  
19 data to the scheduled data.”

20  
21 **Q. How do you respond?**

22 A. Mr. David’s testimony in this instance is troubling. First, there is no reason why  
23 Guidehouse could not provide the VBA-based model to parties in the case, yet it has failed to do

1 so. Second, the use of a Monte Carlo simulation model does not appear to be very useful or  
2 necessary. While a Monte Carlo approach may be able to capture some seasonal variability  
3 across months in the year, doing so is basically meaningless if more fundamental issues are left  
4 unaddressed (e.g. geographic diversity; percentage of solar drop assumed). This would be akin to  
5 preparing a tax return in which the dollar values are rounded to the nearest 1000<sup>th</sup> of a penny,  
6 while forgetting to itemize major deductions. In essence Guidehouse's analysis appears to  
7 provide an unnecessary level of precision in some respects, while failing to correct more  
8 fundamental methodological flaws. In fact, I'm concerned that DESC's reliance on a proprietary  
9 VBA-based Monte Carlo model needlessly creates a "black box" as a means to obfuscate the true  
10 underlying methodology.

11  
12 **Q. DESC acknowledges that some of the analysis included in the Guidehouse report**  
13 **assumes a 60% level of solar is used to calculate operating reserves.<sup>16</sup> However, on page 13,**  
14 **Mr. David's rebuttal states that 60% "is not used in any calculations to determine the VIC;**  
15 **it is only used to show illustrative examples of when there may be operating reserve**  
16 **shortages due to solar generation shortfall if the Company's minimum operating reserve**  
17 **requirement is not increased from its current 250 MW level." How do you respond?**

18 A. I'm encouraged to learn that 60% is not used in the VIC analysis since it is plainly  
19 excessive. However, I have serious concerns about Mr. David's response. First, his statement  
20 calls into question the purpose of the "illustrative examples" that Guidehouse provided in PDB  
21 Exh. 2, Table 13, which appeared to show examples of projected reserve shortages under the  
22 erroneous 60% assumption. The need to increase operating reserves to avoid shortages like these

---

<sup>16</sup> DESC Response to CCEBA Interrogatory 2-17

1 was the underlying premise for DESC to propose the VIC in the first place. At a minimum, the  
2 table with these illustrative examples is rendered completely irrelevant since it uses an erroneous  
3 60% threshold rather than the more reasonable 40% level. As I testified earlier, none of these  
4 instances would show a reserve shortage if the 40% level were used.<sup>17</sup> Second, this does not  
5 resolve the issue of what level of reserves (as a percent of solar output) Guidehouse did  
6 ultimately assume in its own VIC analysis. DESC and Guidehouse have yet to provide that  
7 pivotal piece of information. However, if a simple correction to the formula (i.e., from 60% to  
8 40%) eliminates these illustrative examples of shortfalls, it calls into question the entire premise  
9 of the proposed VIC.

10  
11 **Q. How does Mr. David respond to your claim that the incremental operating reserves**  
12 **Guidehouse assumes for solar are inflated on pages 23-24 of his rebuttal?**<sup>18</sup>

13 A. Mr. David's response is frankly baffling. In the example I gave, I pointed out that the  
14 maximum reserve shortfall projected by Guidehouse for an hour in October was 151 MW, which  
15 is approximately half of the 299 MW in incremental reserves that Guidehouse requires for  
16 October in its VIC analysis. Mr. David then explains that if he were to decrease the incremental  
17 reserve requirements for Tranche 1 in the model from 299 MW to 151 MW, then the total  
18 operating reserve requirement would be 401 MW (i.e., 250 MW baseline plus 151 MW for  
19 Tranche 1), which Mr. David points out is actually *less* than the 498 MW of modeled reserves  
20 available in this hour. Thus, reducing the inflated 299 MW reserve requirement to a more  
21 reasonable 151 MW level would appear to eliminate any potential shortfall in October, thereby

---

<sup>17</sup> Burgess Direct Testimony at page 19.

<sup>18</sup> David Rebuttal, p 23-24

1 confirming my initial claim in opening testimony. However, Mr. David strangely draws the  
2 *opposite* conclusion, stating that such a change could “still result in the same level of potential  
3 reserve shortfall.”<sup>19</sup> This is in direct contradiction to the facts Mr. David just provided showing  
4 that the modeled reserve levels would exceed the minimum by nearly 100 MW. I’m not clear  
5 what to make of Mr. David’s testimony here since the facts he presents are in direct contradiction  
6 with his conclusions. Moreover, the facts he presents appear to support the conclusions of my  
7 opening testimony.

8  
9 Fairfield Pumped Hydro

10 **Q. Do you have any remaining concerns with how Guidehouse has modeled the Fairfield**  
11 **Pumped Hydro facility?**

12 A. Yes. On page 14 of his rebuttal, Mr. David states that “Guidehouse defined specific hours  
13 in which the Fairfield pumped storage asset can (but does not have to if market conditions do not  
14 require it) either pump or generate.” This is concerning to me because it confirms that  
15 Guidehouse is limiting Fairfield’s operations to “specific hours” which appears to be an arbitrary  
16 restriction that may limit its ability to provide reserves during critical hours, even if it does  
17 provide reserves during the vast majority of solar generating hours. Moreover, DESC has not  
18 fully explained why Fairfield provided “zero” reserves in the illustrative examples which I  
19 referenced in my opening.<sup>20</sup> This suggests to me that DESC is still underestimating the capability  
20 of this resource in its analysis.

---

<sup>19</sup> David Rebuttal, page 24, line 22.

<sup>20</sup> Burgess Direct Testimony at page 20.

1 This is especially true due to the fact that this facility can provide flexible reserves at a  
2 cost that is “*de minimus*.”<sup>21</sup> As Mr. David states, “the Fairfield pumped storage facility is  
3 modeled with no variable costs, no start costs, minimum up and down times of only 1 hour, and a  
4 minimum generation level of only 0.1% of its maximum capabilities; so long as the reservoir is  
5 filled to a sufficient level and the asset is otherwise available (i.e. not offline due to planned  
6 maintenance), PROMOD can turn it on immediately in order to provide operating reserves at a  
7 level up to 99.9% of its maximum capability whenever necessary.”<sup>22</sup> This incredible flexibility  
8 suggests to me that the resource should be available to provide quick-start reserves at almost no  
9 cost during most hours, rather than the “zero” contribution I mentioned above. Despite this, Mr.  
10 David mentions that “the model chooses other sources of operating reserves because they result  
11 in lower system costs.” Given the low cost of Fairfield, it is hard to believe that the model would  
12 choose other resources instead, unless other arbitrary restrictions are being applied. Since DESC  
13 has not conducted this study through a transparent stakeholder process it is difficult for me to  
14 assess whether any restrictions DESC has applied to this resource are appropriate.  
15

16 *Geographic Diversity*

17 **Q. How did Mr. David respond to your concerns regarding geographic diversity?**

18 A. Mr. David suggested that I misinterpreted the data DESC provided in 2-14, and that “The  
19 60% drop in solar production does not represent a scenario in which every single facility’s  
20 production simultaneously drops 60%; rather, it represents a scenario in which the production  
21 from a select group of facilities drops to or close to 0 while the rest are entirely unaffected.”

---

<sup>21</sup> David Rebuttal, page 16, line 9.

<sup>22</sup> David Rebuttal, page 16, lines 1-8.

1 **Q. Does this make sense to you?**

2 A. No. It is obvious from examining the workbook provided by DESC in its response to  
3 CCEBA 2-14 (specifically, see Column G of the “Hourly Summary” tab) that a 60% reduction  
4 was applied to the sum of output from all solar facilities on DESC’s system. This is equivalent to  
5 what I stated in my opening testimony – that is, Guidehouse is inappropriately assuming a  
6 simultaneous 60% drop across all facilities is possible when estimating the risk of a reserve  
7 shortfall.

8  
9 **Q. What is your assessment of Mr. David’s claim that there is some correlation in solar  
10 drops due to the relatively small size of DESC’s service territory?**<sup>23</sup>

11 A. Mr. David provided no analysis to support this claim. Moreover, he uses this  
12 unsubstantiated theory as a justification for Guidehouse’s assumption that a 60% solar drop is  
13 possible. Further, the charts shown by Mr. Hanslik from 2021 seem to defy this assumption  
14 since, in each case, a substantial portion of solar generation remains online during the decline  
15 events.

16  
17 Hourly Weighting of Integration Costs

18 **Q. How did Mr. David respond to your critique of Guidehouse’s approach to the weighting  
19 of integration costs?**

20 A. Mr. David’s response was confusing in many respects. First, he does not fully explain  
21 why an hourly weighting approach (which I believe is more accurate) was initially considered  
22 but then later rejected in lieu of a binary weighting approach. Second, he argues that assuming a

---

<sup>23</sup> See David, p 17, lines 10-19.



1 higher level of reserves in the early morning and late evening may be appropriate due to  
 2 operating constraints of thermal units. While I agree that some advanced unit commitment may  
 3 dictate the level of reserves in some cases, this still does not explain why Guidehouse's binary  
 4 assumption is appropriate, or whether these unit commitment issues are actually due to solar. For  
 5 example, in winter months, early morning unit commitment is likely to occur anyways to meet  
 6 the morning system peak, and wouldn't necessarily be attributable to solar. Finally, Mr. David  
 7 continues to make contradictory and illogical arguments. For example, he appears to agree with  
 8 me that the MW magnitude of an unexpected shortfall is more relevant than the percentage  
 9 change.<sup>24</sup> However, in the very next sentence he contradicts this by stating that percentage  
 10 change should take precedence.

11  
 12 Tranche 1 Cost Allocation

13 **Q. How does Mr. David respond to your claim that the integration costs for a 973 MW**  
 14 **solar scenario are over-allocated to the 633 MW of Tranche 1 facilities?**

15 A. Mr. David argues that I am mistaken that some of the integration costs are attributable to  
 16 the Baseline 340 MW tranche, and instead that "All of the incremental increases in minimum  
 17 operating reserve requirements... are attributable specifically to the Tranche 1 solar capacity."<sup>25</sup>

18  
 19 **Q. How do you respond?**

20 A. I disagree with Mr. David's reasoning since it suggests that the 340 MW of Baseline solar  
 21 facilities have zero effect on total operating reserve needs in the Tranche 1 scenario. However, if

---

<sup>24</sup> David Rebuttal, p 20, line 16-17.

<sup>25</sup> David Rebuttal, p 22, line 1-4.

1 the 340 MW of Baseline solar facilities were removed from this scenario, then it is reasonable to  
2 expect fewer incremental operating reserves would be required to support the 633 MW of  
3 Tranche 1 additions. Instead, Mr. David appears to be suggesting that removing the baseline  
4 would make no difference at all. If that is indeed the case, then Guidehouse should redo its  
5 Tranche 1 VIC analysis assuming solar resources equal to 633 MW, rather than 973 MW.

6  
7 Solar Forecast Time Horizon

8 **Q. How does Mr. David address your concerns regarding the use of a 4-hour solar forecast**  
9 **in the model, versus a 1-hour forecast?**

10 A. Mr. David confirms that a 1-hour forecast instead of a 4-hour forecast “would produce  
11 significantly less forecast error”<sup>26</sup> and that this “would have reduced what Guidehouse modeled  
12 as the incremental increase in operating reserve requirements for each tranche of solar.”<sup>27</sup>  
13 However, he also argues that the 4-hour forecast is appropriate because it more closely matches  
14 actual DESC operations.

15  
16 **Q. How do you respond?**

17 A. If DESC operators are still using a solar forecast significantly greater than 1-hour then  
18 they are not following industry best practices. Indeed, Mr. David suggests that DESC, even  
19 though it has developed its own more accurate forecasts, is instead relying on daily forecasts  
20 submitted by solar facilities, such that DESC would most afternoons be relying on forecasting  
21 data that is potentially many more than four hours ahead. Many other system operators around

---

<sup>26</sup> David Rebuttal, page 27, lines 18-19.

<sup>27</sup> David Rebuttal, page 28, lines 7-9.

1 the country currently use forecasts of 1-hour or less for solar and wind.<sup>28</sup> For example, the  
2 California ISO has a solar forecast that updates every 5-minutes. If DESC's operators are using  
3 out-of-date forecasting techniques, that should not serve as a justification for DESC to charge  
4 solar facilities extra (via the VIC) simply to account for the Company's own inefficient operating  
5 practices.

6  
7 **Q. DESC's rebuttal includes several references to the forecasts it receives from solar**  
8 **generation facilities. Do you have any thoughts on how this process might be improved?**

9 A. Yes. CCEBA has indicated to me that they are generally supportive of finding ways to  
10 improve their forecasts from solar facilities as a means to improve DESC's operations and would  
11 be open to a constructive dialog with DESC about this topic. However, it is important to note  
12 that there may be several approaches to doing this. Throughout its rebuttal, DESC suggests that  
13 individual solar facilities are ultimately responsible for providing accurate forecasts to DESC,  
14 and that these forecasts are often inaccurate or absent altogether. However as Mr. Hanzlik's  
15 testimony indicates, there appears to be a strong case for DESC developing the forecast for solar  
16 facilities on its system, rather than individual facilities. To better improve its forecasting, DESC  
17 could work collaboratively with solar facility owners to improve its own centralized forecast  
18 over time, using industry best practices. This would be similar to the approach taken by many  
19 other system operators around the country. As Mr. Hanzlik notes, DESC's own forecast is  
20 already much more accurate than the aggregated forecast of individual facilities, and as such it  
21 would make sense to build upon that superior approach.

22  

---

<sup>28</sup> <https://www.utilitydive.com/news/how-grid-operators-forecast-weather-and-output-from-renewables/561038/>

1 **IV. RESPONSE TO MR. BELL'S REBUTTAL**

2 **Integration Costs Collected Through the Fuel Recovery Charge**

3 **Q. Mr. Bell disputes the notion that the VIC should be based on actual costs due to**  
4 **integration, stating that "The actual costs to which [Mr. Burgess] refers are already**  
5 **embedded in fuel and operating costs and, thus, in the fuel recovery charge."<sup>29</sup> What is**  
6 **your response to this?**

7 A. First, I believe this contradicts the Commission's Order No. 2020-244, which I addressed  
8 in my opening testimony and which requires "actual integration costs" be studied, rather than  
9 theoretical costs.

10 Second, if it is true that actual integration costs are currently being recovered through  
11 DESC's fuel recovery charge, then the fuel recovery charge should be reduced by an amount  
12 equivalent to any dollars collected through the VIC. This is necessary in order to avoid double  
13 recovery of these costs to the detriment of DESC customers.

14  
15 **Q. Can you elaborate on what you mean by double recovery?**

16 A. Yes. As Mr. Bell states, any actual costs of integration are already embedded in the fuel  
17 recovery charge which is being collected from all DESC customers. Meanwhile, DESC is  
18 seeking to simultaneously recover these incremental integration costs from solar QFs through the  
19 VIC. Thus the costs would be inappropriately recovered *twice* by DESC unless a corresponding  
20 adjustment is made to the fuel recovery charge. I am not aware of any proposal from DESC to  
21 make this corresponding adjustment. Such an adjustment should be a condition of the  
22 Commission's approval of any VIC charge in this proceeding. Additionally, the Commission

---

<sup>29</sup> Bell Rebuttal, page 4, lines 4-5.

1 should consider how DESC customers might be remunerated for any integration costs DESC has  
2 overcollected to date due to double recovery through both the fuel recovery charge and the  
3 interim VIC.

4  
5 Actual Versus Projected Integration Costs

6 **Q. What does Mr. Bell assert regarding the Commission's intention for a "true-up" of the**  
7 **current interim VIC?**

8 A. Mr. Bell states that "The Company understands that the Commission never intended for  
9 the true-up to be based on a post-analysis determination of historical costs, but through an  
10 integration charge study like that submitted by Guidehouse in this proceeding."<sup>30</sup>

11  
12 **Q. Do you agree?**

13 A. No. This is not consistent with my understanding of the Commission's previous order  
14 which states that "the VIC/EIC will be subject to a true-up, either up or down, depending on the  
15 actual integration cost indicated by the integration study."<sup>31</sup> Based on a plain reading of the  
16 Commission's Order, I expected that the true-up would be based on the "actual integration cost"  
17 that DESC incurred.

18  
19 **Q. Mr. Bell's rebuttal discusses the fact that DESC's reserves in recent years have been**  
20 **higher than the minimum level required. He also insinuates that your testimony suggested**  
21 **that this was not a normal outcome.<sup>32</sup> Is that correct?**

---

<sup>30</sup> Bell Rebuttal, page 4, lines 14-17

<sup>31</sup> Order No. 2020-244, p 5-6.

<sup>32</sup> Bell Rebuttal, page 6 line 9-11.

1 A. No. Mr. Bell has mischaracterized my position. In fact, my opening testimony agreed  
2 with Mr. Bell on this point. As I had clearly stated, the fact that DESC has excess reserves at  
3 times “does not necessarily mean that DESC is operating its system inefficiently as there may be  
4 instances where the most efficient dispatch scenario also leads to excess operating reserves.”<sup>33</sup>  
5 Meanwhile, what Mr. Bell omits from his rebuttal is the fact that that DESC should be able to  
6 use these excess reserves to integrate solar at little to no additional cost.

7  
8 **Q. Mr. Bell argues that your analysis of historical data is a “casual observation” and that**  
9 **only a study using projections is capable of assessing the true integration costs. Do you**  
10 **agree?**

11 A. No. I do not consider the historical data that DESC provided to be a “casual observation.”  
12 These data reflect the real results of DESC’s operations, which have already accommodated the  
13 vast majority of the Tranche 1 facilities. Thus I believe this data is a reliable indicator of the  
14 level of operating reserves that DESC will need to accommodate these facilities going forward.  
15 In fact, I believe this historical data is a more reliable and transparent indicator than the  
16 Guidehouse projections which include black box formulas that parties to this case have not been  
17 able to examine.

18 **Q. How did Mr. Bell respond to your observation that the reserves it typically carries far**  
19 **exceed the baseline requirement in the Guidehouse study of 250 MW (as well as the**  
20 **requirements for Tranches 1, 2 and 3)?**

---

<sup>33</sup> Burgess page 15, fn 6.

1 A. Mr. Bell concurs with my observation. However, it is worth noting that Mr. Bell omits  
2 any explanation of whether additional reserves are needed to integrate solar beyond what is  
3 typical for DESC to carry.

4  
5 Other Issues (e.g., Solar Forecast, SEEM, Mitigation Protocol)

6 **Q. Do you agree with Mr. Bell's statement that the use of a 1-hour forecast would lead to**  
7 **minimal reduction in operating reserve costs?**<sup>34</sup>

8 A. No. In fact this position appears contradictory to Mr. David's rebuttal testimony which  
9 states that "using a 1-hour ahead forecast of solar generation rather than a 4-hour ahead forecast  
10 in comparison against actual generation would produce significantly less forecast error."<sup>35</sup>

11  
12 **Q. Does Mr. Bell dispute the notion that a regional imbalance market like SEEM would**  
13 **help reduce DESC's solar integration costs?**

14 A. Yes. His rebuttal testimony on page 10 addresses this.

15  
16 **Q. What is your response to that position?**

17 A. It is concerning due to the fact that renewable integration is one of the primary benefits  
18 that the proponents of SEEM have touted in recent months. For example, the front page of the  
19 SEEM website states the following: "Benefits include cost savings for customers and better  
20 integration of diverse generation resources, including rapidly growing renewables and fewer  
21 solar curtailments."<sup>36</sup>

---

<sup>34</sup> See Bell Rebuttal at page 9.

<sup>35</sup> David Rebuttal, page 27, lines 16-19.

<sup>36</sup> <https://southeastenergymarket.com/>

1 **Q. Does Mr. Bell agree with your suggestion that South Carolina should adopt the same**  
2 **mitigation protocol (or modified version of it) that Dominion has already used in North**  
3 **Carolina?**

4 A. No. This inconsistency is somewhat perplexing to me since there is no fundamental  
5 difference in solar variability between the two states. Furthermore, DESC provided no  
6 meaningful justification for the rejection of its own North Carolina protocol.  
7

8 **V. RESPONSE TO MR. HANZLIK'S REBUTTAL**

9 **Q. Have you reviewed the rebuttal testimony of Mr. Hanzlik?**

10 A. Yes.  
11

12 **Q. What were your general impressions based on this review?**

13 A. Mr. Hanzlik provided useful insights into the way in which DESC's system operators  
14 have managed to integrate solar facilities into their day-to-day operations. I found the  
15 information to be very helpful in illustrating the actual operational issues of solar integration that  
16 DESC faces.  
17

18 **Q. Do you believe anything stated in Mr. Hanzlik's rebuttal is significantly at odds with**  
19 **your opening testimony?**

20 A. With the exception of the final page, no, I found that Mr. Hanzlik's testimony was largely  
21 consistent with my understanding of DESC's system, the impacts that solar has on that system,  
22 and the claims that I made in my opening testimony.  
23



1 Changes in Operating Practices to Integrate Solar

2 **Q. On the final page of his testimony, Mr. Hanzlik disputes the notion that DESC's solar**  
3 **integration costs may be close to zero and discusses how solar affects his actual real-time**  
4 **experience in the control room. How do you respond?**

5 A. First, I want to make it perfectly clear that my opening testimony and this surrebuttal are  
6 in no way intended to minimize the importance of the job that DESC's System Control team,  
7 including Mr. Hanzlik, performs on a daily basis. This is a critical service that DESC provides to  
8 its customers.

9 Additionally, I agree with Mr. Hanzlik that the introduction of solar creates new  
10 operational challenges that the traditional approach to system control must adapt to. This  
11 undoubtedly makes Mr. Hanzlik's job more challenging in some ways. However, the important  
12 question for the Commission to consider is not whether solar has led to changes in DESC's  
13 operations – clearly that is true. Instead, the relevant question is whether or not these new  
14 operating practices amount to any meaningful increase in DESC's operating costs that are then  
15 passed on to DESC customers.

16 While Mr. Hanzlik shows how the system responds to real-world fluctuations in solar  
17 output, he does not present any information demonstrating that this leads to a meaningful  
18 increase in operating costs that are charged to DESC customers. By the same token, Mr.  
19 Hanzlik's testimony does not claim that DESC has needed to increase the total amount of  
20 operating reserves it normally commits even as solar has come online. While there may come a  
21 point in time where DESC needs to increase the total operating reserves it normally commits in  
22 order to accommodate solar, nothing in Mr. Hanzlik's testimony suggests that this has happened  
23 yet.

1  
2 **Q. Has DESC previously provided testimony that it could provide some level of operating**  
3 **reserves to accommodate solar at no additional cost?**

4 A. Yes. Mr. Neely explained this during the DESC IRP proceeding, that for certain  
5 operating reserve resources that are off-line (i.e., quick start) “doesn’t add any cost.”<sup>37</sup>  
6

7 **Q. Mr. Hanzlik mentions the addition of a renewables desk in its control room. What are**  
8 **your thoughts on this?**

9 A. I view the addition of a renewables desk in the control room as a positive development  
10 towards more seamless integration of solar resources. Furthermore, I would contend that the  
11 costs of supporting the renewables desk operation is probably more representative of DESC’s  
12 actual integration costs than what has been presented by DESC to date in this proceeding,  
13 including the Guidehouse analysis.  
14  
15

16 *Recent Solar Decline Events*

17 **Q. Mr. Hanzlik provides a number of examples of recent instances where DESC has had to**  
18 **accommodate a decline in solar output. Do you have any comments on these examples?**

19 A. Yes. I will address each of these examples.

20 First Mr. Hanzlik shows a drop in solar production that occurred on June 18, 2021. This  
21 amounted to a drop in generation of about ~200 MW over 2 hours (or about ~25 MW per 15-min  
22 period). It is worth noting that this is significantly less than the 581 MW of required operating

---

<sup>37</sup> DESC IRP Hrg. Tr. at 363.

1 reserves for solar that Guidehouse assumes for Tranche 1 in the month of June. It is also much  
2 less than the average amount of operating reserves DESC actually held on its system for this  
3 month, which exceeded 1,000 MW.<sup>38</sup>

4 Second, Mr. Hanzlik shows a drop in solar production that occurred on July 27, 2021.  
5 This amounted to a drop in generation of about ~150 MW over 45 minutes (or about ~50 MW  
6 per 15-min period). It is worth noting that this is significantly less than the 561 MW of required  
7 operating reserves for solar that Guidehouse assumes for Tranche 1 in the month of July. It is  
8 also much less than the average amount of operating reserves DESC held on its system last July,  
9 which exceeded 1,000 MW.<sup>39</sup> While I agree that the drop in production at the Peony facility in  
10 both of these cases was significant when viewed in isolation, it appears to have been a  
11 manageable event when viewed from the DESC system perspective. Furthermore, the afternoon  
12 drop that occurred on July 27<sup>th</sup> was actually roughly consistent with the developer's forecast.

13 Finally, Mr. Hanzlik shows a drop in solar production that occurred on July 29, 2021. In  
14 this case, Mr. Hanzlik focuses on the reduction in solar output that occurs in the late afternoon as  
15 the sun is setting, which occurs shortly after DESC's system peak load. What is important to  
16 keep in mind here is that the change in net load as solar comes off-line in the evening is not a  
17 surprise and is a well-understood issue for system operators and planners. While this challenge  
18 must be addressed, it is not necessarily an "integration cost" *per se* as DESC has defined it— that  
19 is, this drop in production is *expected* in advance and can be planned for. This contrasts with the  
20 integration costs associated with the VIC which reflect the operating reserves required to handle  
21 *unexpected* drops in production.

---

<sup>38</sup> See Burgess opening testimony, Table 1.

<sup>39</sup> See Burgess opening testimony, Table 1. Data for July 2021 was not provided by DESC.

1 As with the previous July example, the drops in production during the day are  
2 significantly less than the operating reserve requirements Guidehouse modeled for July. They are  
3 also less than the reserves typically available on DESC's system even before any solar was  
4 deployed on the system.

5  
6 **Q. Do you have any general conclusions to draw from the examples that Mr. Hanzlik**  
7 **presented?**

8 A. To date, the integration of solar on DESC's system appears to be manageable and does  
9 not appear to require the extreme increases in operating reserves that the Guidehouse VIC  
10 analysis suggests. Presumably Mr. Hanzlik would agree that DESC has been operating its system  
11 in a reliable manner prior to any recommendations from Guidehouse for excessively increasing  
12 operating reserves. Additionally, while known in advance, I appreciate the challenge that  
13 reduced solar output presents when it coincides with the summer afternoon peak around 4pm. As  
14 such, I would support efforts to encourage or incentivize the avoidance of solar drops at this time  
15 (e.g. via battery storage). However, this is a wholly separate issue than DESC's proposed VIC  
16 and purported integration costs.

17 Solar Forecasting

18 **Q. Mr. Hanzlik commented on the generation forecasts provided to DESC by solar**  
19 **facilities, and how these cannot necessarily be relied upon. How do you respond?**

20 A. I can't speak to the specifics of Mr. Hanzlik's claims, but agree that increasing the  
21 accuracy of solar facility forecasts would likely be helpful. That said, this is somewhat  
22 immaterial because DESC already develops its own forecast for these facilities that appears to be

1 far more accurate. As the chart on page 23 of his testimony shows, the DESC forecast tracks  
2 very closely with actual production throughout the day.

3  
4 **Q. Do you have any further observations about this chart on page 23?**

5 A. Yes. First, it is worth noting that the aggregated developer forecasts represent an *under-*  
6 forecast not an *over-*forecast. Meanwhile, the VIC analysis only considers drops in solar  
7 production from what was expected (i.e., over-forecasts), thus the fact that the solar developers  
8 tend to underpredict generation should have no bearing on the integration costs being considered  
9 in this proceeding. Second, Mr. Hanzlik mentioned that some developers do not provide a  
10 forecast. The fact that developer generation forecast is so much lower than DESC's leads me to  
11 believe that this chart might simply be a reflection of the missing forecasts, and is not solely due  
12 to any inaccuracies of the forecasts that were actually provided.

13  
14 **Q. What does Mr. Hanzlik say regarding the forecast time horizon?**

15 A. Mr. Hanzlik challenges the notion that a 1-hour solar forecast would be that helpful,  
16 stating that "the accuracy or the timeframe of the forecasts cannot eliminate the need for  
17 Operating Reserves given that the variability of solar remains in all scenarios."<sup>40</sup>  
18 While I don't disagree, this statement is somewhat misleading since no serious analyst would  
19 expect an improved forecast to *completely* eliminate the need for Operating Reserves. In fact, it  
20 is likely that an improved forecast could significantly reduce the Operating Reserves needed  
21 within a day even if they are not completely eliminated. For example, a 1-hour forecast might  
22 anticipate an unexpected storm front that emerges in the afternoon that was not captured in a 4-

---

<sup>40</sup> Hanzlik Rebuttal, p 25.

1 hour forecast. If this weather pattern were expected to decrease solar output from 400 MW in the  
2 original forecast to 300 MW, then that is a 25% reduction in the solar resources that are at risk of  
3 dropping and for which operating reserves must compensate. DESC's operators could then  
4 respond in real time by reducing the amount of operating reserves they commit to accommodate  
5 solar by approximately 25%. That said, it does not appear that DESC has appreciably increased  
6 its Operating Reserves to date to accommodate the significant solar on its system, and therefore  
7 any improvements to solar forecasting may not impact Operating Reserve requirements until  
8 more solar has been added to the system.

9  
10 Fairfield Pumped Hydro

11 **Q. Mr. Hanzlik discussed the interaction between solar and Fairfield Pumped Storage**  
12 **(FFPS) facility on a day in January 2021. What do you conclude from this episode?**

13 A. This episode demonstrates how resources like FFPS provides substantial flexibility to  
14 integrate solar, in combination with the use of necessary solar curtailment. While Mr. Hanzlik's  
15 characterization of these tools is somewhat negative, I don't believe the use of pumped storage or  
16 curtailment for integration purposes should be viewed as a bad thing. While the elevation of the  
17 reservoir did approach its limit, it did not actually exceed this limit, and curtailment of solar  
18 could be utilized to avoid potential future exceedances. I believe that over time DESC will learn  
19 from this experience to avoid similar issues in the future. Additionally, necessary curtailment  
20 under extreme conditions is a helpful tool for solar integration and can be better implemented  
21 through more flexible solar contract options as more solar comes online.

1 **VI. RESPONSE TO MR. KASSIS'S REBUTTAL**

2 **Stakeholder Process**

3 **Q. Do you agree with Mr. Kassis' characterization that there has been a robust stakeholder**  
4 **and peer review process leading to its VIC proposal?**

5 A. No. Mr. Kassis seems to be suggesting that because DESC's previously proposed VIC  
6 was litigated and rejected by this Commission in Docket No. 2019-184-E that a sufficient  
7 stakeholder process has occurred. In my opinion, that previously litigated proceeding, which  
8 focused on an entirely different integration study, in no way represents a valid substitute for a  
9 robust stakeholder engagement or peer review process of DESC's current integration study. This  
10 is not consistent with a common understanding of stakeholder engagement or the peer review  
11 process.

12  
13 **VII. CONCLUSION**

14 **Q. Based on your review of DESC's rebuttal testimony, have you made any changes to the**  
15 **recommendations included in your direct testimony?**

16 A. No. I continue to recommend that the Commission should either:

17 a) fix the VIC at a level consistent with the recommendations in my opening testimony  
18 (i.e., at zero or at the alternative calculations), or

19 b) eliminate the VIC until the Commission adopts a new avoided cost rate in the future.  
20 Under this latter approach, any future VIC should only apply prospectively to PPAs executed  
21 after that new rate is approved.

22 **Q. Does this conclude your Rebuttal Testimony?**

23 A. Yes.